Claims

1. A method of analyzing a physiological signal during application of chest compressions, the method comprising:

acquiring a physiological signal during application of chest compressions;

acquiring the output of a sensor from which information on the velocity of chest compressions can be determined; and

using the information on the velocity to reduce at least one signal artifact in the physiological signal resulting from the chest compressions.

2. The method of claim 1 wherein the physiological signal is an ECG signal.

3. The method of claim 1 wherein the physiological signal is an IPG signal.

4. The method of claim 1 wherein the physiological signal is an ICG signal.

5. The method of claim 1 wherein the physiological signal is a pulse oximetry signal.

7. The method of claim 1 or 2 wherein the sensor is a velocity sensor, and the information on the velocity is determined from the velocity sensor.

8. The method of claim 1 or 2 wherein the sensor is an accelerometer, and the information on the velocity is determined from integration of the output of the accelerometer.

9. The method of claim 1 or 2 wherein using the information on the velocity to reduce at least one signal artifact in the physiological signal comprises time aligning the physiological signal with the velocity.

10. The method of claim 1 or 2 wherein using the information on the velocity to reduce at least one signal artifact in the physiological signal comprises using an adaptive filter that is adjusted to remove chest compression artifacts.

11. The method of claim 1 or 2 further comprising a ventricular fibrillation detection algorithm for processing the physiological signal with reduced artifact to estimate whether a ventricular fibrillation is present.

12. The method of claim 10 further comprising a preprocessing step that detects when chest compressions are applied and automatically initiates the adaptive filter.

13. The method of claim 11 further comprising enabling delivery of a defibrillation shock if the algorithm estimates that ventricular fibrillation is present.

14. The method of claim 10 wherein a difference signal is produced, the difference signal being representative of the difference between the physiological signal fed into the adaptive filter and the physiological signal after artifact reduction by the adaptive filter.

15. The method of claim 14 wherein the difference signal provides a measure of the amount of artifact in the physiological signal.

16. The method of claim 15 further comprising the step of using the difference signal to modify the subsequent processing of the physiological signal.

17. The method of claim 16 wherein, if the difference signal indicates that the amount of artifact exceeds a first threshold, the ventricular fibrillation detection algorithm is modified to make it more resistant to being influenced by the artifact.

18. The method of claim 17 wherein, if the difference signal indicates that the amount of artifact exceeds a second threshold higher than the first threshold, use of the ventricular defibrillation detection algorithm is suspended.

19. The method of claim 16 wherein spectral analysis is performed on the difference signal, and adjustments are made to filtering of the physiological signal based on the outcome of the spectral analysis.

20. The method of claim 10 wherein the velocity signal undergoes a normalization pre-processing prior to being fed to an adaptive filter

21. The method of claim 10 wherein the adaptive filter comprises an FIR filter.

22. The method of claim 21 wherein the adaptive filter comprises a zero-th order filter.

23. The method of claim 10 wherein the adaptive filter comprises coefficients that are dynamically controlled by an estimate of the physiological signal.

24. The method of claim 10 wherein the adaptive filter comprises the capability of being automatically reset when the difference between the filter output and the measured physiological signal is beyond a threshold.

25. The method of claim 24 wherein the automatic reset comprises the capability of dynamically changing the step size and thus improving the relationship of convergence and stability of the filter.

26. The method of claim 1 or 2 further comprising a time-aligning process performed on the physiological and velocity signals, wherein the time aligning process aligns the two signals relative to the compressions.

27. The method of claim 26 further comprising adaptive filtering of the output of the time aligning process, wherein the adaptive filtering reduces the error between the physiological and velocity signals.

28. The method of claim 10 wherein the adaptive filter comprises a Kalman filter.

29. The method of claim 10 wherein the adaptive filter employs adaptive equalization.